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23413	7590	12/22/2004	EXAMINER	
CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			GARCIA OTERO, EDUARDO	
			ART UNIT	PAPER NUMBER
			2123	
DATE MAILED: 12/22/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/075,804

Applicant(s)

LANDERS ET AL.

Examiner

Eduardo Garcia-Otero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 8/16/04 and 9/23/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-187 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-187 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/16/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION: Final Action

Introduction

1. Title is: AUTOMATED HORIZONTALLY STRUCTURED MANUFACTURING PROCESS DESIGN MODELING
2. First named inventor is: LANDERS
3. Claims 1-187 have been submitted, examined, and rejected. Claims 1, 60, 119, and 153 are independent claims.
4. Priority is claimed to provisional US application 60/276,255 filed 3/14/2001.
5. Applicant's Information Disclosure Statement (IDS) was received 8/16/04, and Amendment received 9/23/04.
6. Claim 153 is amended, all other claims are not amended.

Index of Important Prior Art

7. Freilich refers to US patent 6,599,125.
8. Solid Edge V6 refers to Solid Edge User's Guide Version 6, MU28900-ENG, by Unigraphics Solutions TM, copyright 1998, pages 28, 29, 33, 90, 91, 96, 157, and 178.
9. Chu refers to "Operation Planning in NC Programming Based on CAD Systems", by Chi-Hsing Chu et al, 2/22/2002, from Applicant's IDS.
10. Spence refers to "Integrated solid modeler based solutions for machining", by A.D. Spence et. al., Computer-Aided Design 32 (2000) 553-568, from Applicant's IDS.
11. Artificial Intelligence refers to Artificial Intelligence (Understanding Computers series), by Time-Life Books, 1986, ISBN 0-8094-5675-3, pages 36-43.

Applicant Remarks

12. ABSTRACT, OBJECTION WITHDRAWN. The prior objection to the Abstract is withdrawn due to Applicant's Amendments.
13. SPECIFICATION, OBJECTIONS WITHDRAWN. The prior objections regarding Specification page 5 paragraph 5 are withdrawn due to Applicant's amendments and assertions.
14. Remarks page 22. Regarding Specification page 19 "reference set 26", Applicant asserts "the reference set is essentially a "copy" of the geometric features of a product model

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without necessarily incorporating the entire model”, and Applicant references Solid Edge Users Guide V8 page 377 regarding an associative copy.

15. Solid Edge V8 page 377 defines “associative copy” as “A copy that has a connection to the original. If the original is changed, the copy updates.” The term “associative copy” does not appear relevant here.
16. Solid Edge V8 page 377 defines “associative” as “A condition in which an element is related to another element”. The parent/child relationship is one type of associative relationship.
17. Applicant states “virtual blank 10 has an associative relationship with the reference set 26, while the master process model 20 exhibits an associative relationship with the virtual blank 10”. In view of FIG 5, the associative relationship appears to be a parent-child relationship, which is unidirectional. Note the arrows in FIG 5. Thus, it appears that reference set 26 is the parent of virtual blank 10, and virtual blank 10 is the parent of master process model 20. The Applicant has amended the specification to clarify this.
18. Thus, the prior objections regarding Specification page 19 are withdrawn.
19. CLAIM REJECTIONS, 35 USC 101, WITHDRAWN. The prior 35 USC 101 rejections are withdrawn due to Applicant’s amendments.
20. CLAIM REJECTIONS, 35 USC 112 FIRST PARAGRAPH ENABLEMENT, AND SECOND PARAGRAPH INDEFINITE. Remarks page 24-25. Applicant asserts that the Examiner is not claiming a knowledge based system, but rather “integrating the generation of manufacturing process sheets (instructions) with the master process model”. However, claim 1 states **“capturing manufacturing process rules in a spread sheet”**.
21. Applicant further asserts that claim 1 is definite.
22. The Examiner maintains that claim 1 has substantial difficulties regarding enablement and indefiniteness. These difficulties are intermingled, so the Examiner will address them simultaneously now.
23. Let us carefully discuss the 9 limitations of claim 1, in view of FIG 5.
24. [1]-**“selecting a blank for machining into an actual part”**. No problems. Freilich column 8 line 40 states “The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes.” Thus, this “blank” is a solid physical object.

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25. [2]-**“establishing a coordinate system”**. It is not clear which type of coordinate system is desired. Solid Edge V6 page 96 states “The types of reference planes are base, global, and local...”. A coordinate system is shown at the top left of FIG 5, element 6, and is a “relative” system per Specification page 7 line 19. The Examiner interprets this as a “local” system.
26. [3]-**“creating a master process model comprising: a virtual blank corresponding to said blank...”**. This does not appear to accurately reflect the parent child relationship between the virtual blank 10 and the master process model 20, as discussed above and as Specification page 19. No physical blank (per Freilich) is shown in FIG 5.
27. Additionally, the term “corresponding to” is interpreted by the Examiner as “having the same physical dimensions as”.
28. [4]-**“[creating a master process model comprising: ...] a manufacturing feature”** is disclosed by Solid Edge V6 page 33 “Solid Edge provides protrusion and rib commands to add material, and cutout and hole commands to remove material”. It is not clear whether the virtual blank continues to exist, or serves as a parent for an associative copy, and then the manufacturing feature is imposed upon the associative copy. See Applicant’s Remarks page 22 regarding “associative copy”.
29. [5]-**“virtual machining of said manufacturing feature into said virtual blank”** is not clear. It is not clear if “virtual machining” is intended as merely designing the feature, or if “virtual machining” implies providing instructions to a virtual machining tool (such as a virtual drill) to create the virtual feature into said virtual blank.
30. [6]-**“said manufacturing feature exhibiting an associative relationship with said coordinate system”** is not clear. If the manufacturing feature exhibits an associative relationship (directly?) to said coordinate system, then does that imply that the virtual blank also exhibits a separate relationship directly to the same coordinate system? Does the “reference set of geometry” have a relationship to said coordinate system? Basically, it appears that the virtual blank must somehow be situated with respect to the local coordinate system before applying manufacturing features (if the manufacturing features are associated with the local coordinate system).
31. [7]-**“generating machining instructions to create said actual part by machining said manufacturing feature into said blank”**. This claim limitation may be an expert system

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type limitation. Translating complex curves into machining instructions is not trivial, particularly if the axes of motion of the machine do not match the axes of the complex curves. On the other hand, some instructions are relatively simple, such as drilling a hole. Freilich discloses at least some of this at column 8 line 40 "The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes." Note that CAD (Computer Aided Design) implies that actual physical structural blank has a virtual counterpart which is used for CAM (Computer Aided Machining).

32. Specification FIG 7 shows a

33. [8]-**"capturing manufacturing process rules in a spread sheet"** is not clear. The term "manufacturing process rules" is not clear, and may refer to features and their associative relationships to the coordinate system, or may refer to the specific manufacturing/machining instructions necessary to generate a feature, or may refer to generating (expert system) the specific machining instructions based upon the specific feature and associative relationship.

34. Applicant Remarks page 25 states "means of automating the manufacturing process by integrating the generation of manufacturing process sheets (instructions) with the master process model. In the way, when modifications are established in one, the changes are automatically flowed to the others. The existing art includes no linking between the manufacturing environment and the modeling environment".

35. Thus, Applicant appears to intend some type of expert system ("automating"), but it is not quite clear what is intended.

36. See Specification page 24 regarding "process sheets".

37. [9]-**"said spread sheet exhibiting another associative relationship with said master process model"** is not clear. Again, it is not clear if the claim 1 term "spread sheet" is equivalent to the Specification page 24 term "process sheets".

38. To summarize, claim 1 has substantial issues regarding enablement and definiteness. The 35 USC 112 rejections are maintained, with one exception.

39. In claims 16 and 35, the term **"reference set geometry is defined by dimensional characteristics of a modeled part"** is now definite in view of the amendments to the Specification. The prior indefiniteness rejection is withdrawn with respect to this term.

40. 35 USC § 112- first paragraph- enablement

41. The following is a quotation of the first paragraph of 35 U.S.C. 112: The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
42. **Claims 1-187 are rejected under 35 U.S.C. 112, first paragraph**, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.
43. The claim 1 term **“capturing manufacturing process rules in a spread sheet”** is not enabled. The specification does not adequately enable a knowledge based expert system consisting of manufacturing process rules from machining handbooks and from experience of expert operators.
44. For example, note that Chu page 1 states “all necessary information that drives the NC machine... two main categories – geometric data and technical data. The technical data are generally determined with the aid of machining hand books or according to the **machining experience of operators**; it includes tool selection, arrangement of machining sequences and decision of cutting parameters. After those data have been decided, geometric information such as cutter location data in every tool pass can be obtained... CAD/CAM systems provide the **possibility to generate necessary information of NC programs directly** from the CAD model of a workpiece”. Emphasis added.
45. Chu page 20 also states “Data transfer between models and communication of separate NC functions need further investigation” and “it is possible to embed the proposed NC planning functions into the next generation machine tool controller to offer a crucial link between planning and fabrication during rapid-manufacturing by machining. This work provides a systematic description of these function requirement”. Note that Chu is dated 2/22/2002, which is after the present applications claimed priority date of 3/14/2001.
46. Thus, even though Chu is later than the present application, Chu still uses words indicating lack of enablement: like “need further investigation” and “next generation machine tool

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controller” at page 20, and “critical points that remain deficient in using CAD/CAM systems on NC programming... Important tasks are as follows” at page 17.

47. See above discussion of knowledge based expert systems for additional details. Note the difficulty of capturing expert knowledge such as “machining experience of operators”.

48. Also in claim 1, the term “**generating machining instructions**” is similarly not enabled.

49. See the Applicant’s Remarks section above for additional discussion.

50. Claims 2-187 are not enabled for the same reasons as claim 1.

51. 35 USC § 112-Second Paragraph-indefinite claims

52. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

53. **Claims 1-187 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

54. The claim 1 term “**associative relationship**” is indefinite.

55. Note that said term occurs twice in claim 1, and appears to have different meanings: “said manufacturing feature exhibiting an **associative relationship** with said coordinate system” and “said spread sheet exhibiting another **associative relationship** with said master process model”. The first relationship is positional (geometric), but the second relationship is not positional. Thus, the same term is improperly used for two different meanings.

56. The claim 2 term “**said associative relationship**” is indefinite. Note that there are distinct associative relationships in parent claim 1, and it is not clear which associative relationship from claim 1 is being further limited in claim 2.

57. Claims 3-187 are indefinite for the same reasons as claim 1.

58. See the Applicant’s Remarks section above for additional discussion.

59. Claim Interpretation

60. **The claim language is interpreted in light of the specification.** Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

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61. In claim 1, the preamble term **“horizontally structured CAD/CAM”** is given little weight, and is not interpreted as a claim limitation. There appear to be at least 2 possible and very different meanings of the term “horizontal”.
62. First, regarding modeling the virtual blank, the term “horizontal tree structure” is defined at page 4 as “preferably by establishing an exclusive parent/child relationship between a set of reference planes and each feature”. However, features having additional features as children are not expressly excluded. Further, specification page 10 expressly allows features to have children: “certain form features may be preferably dependent from other form features or model elements rather than directly dependent as children from the 3-D coordinate system... For example, and edge blend... the intent being to keep the lineage as short as possible...” If the term “lineage as short as possible” were given weight as a claim limitation, then it would be indefinite. Also, see “additional datum planes” at specification page 10.
63. Second, regarding virtual machining, the specification page 17 states “generating process sheets... add via virtual machining... manufacturing features (12a-12j) to the virtual blank 10 in a horizontally-structured manner”. In this context, “horizontally” appears to mean sequentially in time, per specification page 17 that states “snapshot” of “the assembly of the master process model 20 in progress, showing all of the manufacturing features 12a-12j up to that operation in the assembly, but none that come after it.” See above discussion of “associative relationship” in the indefiniteness rejections of claims 1 and 2.
64. In claim 9, the term **“extract”** is interpreted as a “snapshot” of the assembly of the master process model in progress, per specification page 17.
65. Said interpretations are maintained throughout the claims.

Claim Rejections - 35 USC § 103

66. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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67. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: Determining the scope and contents of the prior art. Ascertaining the differences between the prior art and the claims at issue. Resolving the level of ordinary skill in the pertinent art. Considering objective evidence present in the application indicating obviousness or nonobviousness.
68. **Claims 1-187 are rejected under 35 U.S.C. 103(a) as being unpatentable.**
69. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
70. Independent claim 1 is “method” claim with 9 limitations, numbered by the Examiner for clarity.
71. [1]-“**selecting a blank for machining into an actual part**” is disclosed by Freilich column 8 line 40 “The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes.”
72. [7]-“**generating machining instructions to create said actual part by machining said manufacturing feature into said blank**” is Freilich column 8 line 40 “The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes.”
73. The additional limitations are not explicitly disclosed by Freilich.
74. [2]-“**establishing a coordinate system**” is disclosed by Solid Edge V6 page 96 “The types of reference planes are base, global, and local...”.
75. [3]-“**creating a master process model comprising: a virtual blank corresponding to said blank...**” is disclosed by Freilich column 8 line 40 “The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes.” Note that CAD (Computer Aided Design) implies that actual physical structural blank has a virtual counterpart which is used for CAM (Computer Aided Machining).
76. [4]-“**a manufacturing feature**” is disclosed by Solid Edge V6 page 33 “Solid Edge provides protrusion and rib commands to add material, and cutout and hole commands to remove material”.
77. [5]-“**virtual machining of said manufacturing feature into said virtual blank**” is disclosed by Solid Edge V6 page 33 “Solid Edge provides protrusion and rib commands to

add material, and cutout and hole commands to remove material” and page 28 “complete the model by adding material to (B) or removing material from (C) the previous features”. And also implicitly disclosed by Freilich column 8 line 40 “The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes” and column 2 line 18 “further modified, for example by cutting, carving”.

78. [6]-“**said manufacturing feature exhibiting an associative relationship with said coordinate system**” is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
79. [8]-“**capturing manufacturing process rules in a spread sheet**” is disclosed by Solid Edge V6 pages 221 “Operation Navigation Tool (ONT)” and page 222-223 for examples of spreadsheets, and Spence FIG 2.
80. [9]-“**said spread sheet exhibiting another associative relationship with said master process model**” is disclosed by Spence at Abstract “developing a comprehensive physical machining process simulation program based on a solid modelling kernel”. Note that Spence’s “solid modelling kernel” is equivalent to Freilich’s CAD system, and exemplified by Solid Edge V6. Additionally, note that Spence’s “physical machining” is equivalent to Freilich’s CAM. Thus, Freilich term “CAD/CAMming” is implicitly teaching towards the integration of CAD and CAM, as expressly discussed in Spence.
81. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Solid Edge V6 and Spence to modify Freilich. Starting with Freilich’s broad discussion of “CAD/CAMming”, one of ordinary skill would have looked to Solid Edge V6 for a standard CAD engine (or “solid modeling kernel” in Spence’s terminology) and standard techniques for modeling the construction blanks, and the desired dental devices. Further, one of ordinary skill in the art would have looked to Spence to save time and money by automating the complex and labor intensive physical machining process for the complex curves and complex voids in dental devices. Spence abstract uses the terminology

“developing a comprehensive physical machining process based on a solid modeling kernel”.

Additionally, note that Freilich recognizes and implicitly teaches toward the union and merging of CAD and CAM by using the term “CAD/CAMming”.

82. Claims 2-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
83. Claims 2-59 depend from independent “method” claim 1.
84. In claims 2, 4, 6, 8, 12, 23, 24, 25, 26, 27, 31, 43, 45, 46, 51, 52, 53, 54, 56, 57, 58, and 59 **“associative relationship”** is disclosed by Solid Edge V6 page 178 “To fully control one part in relation to other parts in an assembly, you must use a combination of assembly relationships. There is often more than one way to apply relationships that will position a part correctly. It is important to choose the way that best captures design intent, because this makes your assembly easier to understand and edit.” Note that one of ordinary skill in the art would interpret Solid Edge broadly as disclosing common types of associative relationships, including parent/child relationships.
85. In claim 3 **“another manufacturing feature exhibiting an associative relationship with said manufacturing feature”** is disclosed by Solid Edge V6 page 178 “To fully control one part in relation to other parts in an assembly, you must use a combination of assembly relationships. There is often more than one way to apply relationships that will position a part correctly. It is important to choose the way that best captures design intent, because this makes your assembly easier to understand and edit.” For example, a hole may be a first manufacturing feature, and internal threads in the hole may be a second associated manufacturing feature. The related CAM actions would be drilling said hole, and cutting said threads.
86. In claim 5, **“virtual blank exhibits an associative relationship with another said manufacturing feature”** is disclosed by Solid Edge V6 page 178 “To fully control one part in relation to other parts in an assembly, you must use a combination of assembly relationships. There is often more than one way to apply relationships that will position a part correctly. It is important to choose the way that best captures design intent, because this makes your assembly easier to understand and edit.”

87. In claim 7, **“said virtual blank exhibits an associative relationship with said coordinate system”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
88. In claim 9 and 28, **“creating extracts from said master process model”** is disclosed by Solid Edge V6 page 90 “feature construction process”, and also see Applicant’s discussion at specification page 17 “In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process” and “snapshot” and “of the assembly of the master process model 20 in progress”.
89. In claim 10 and 29, **“extracts comprise replicated models of said master process model at various operations of said manufacturing”** is disclosed by Solid Edge V6 page 90 “feature construction process”, and Applicant’s admission at specification page 17 “In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process” and “snapshot” and “of the assembly of the master process model 20 in progress”.
90. In claim 11 and 30, **“extracts exhibit an associative relationship with said master process model”** is disclosed by Solid Edge V6 page 90 “feature construction process”, and also see Applicant’s discussion at specification page 17 “In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process” and “snapshot” and “of the assembly of the master process model 20 in progress”.
91. In claim 13 and 32, **“said extracts are used to generate manufacturing process sheets”** is disclosed by Solid Edge V6 page 90 “feature construction process”, and also see Applicant’s discussion at specification page 17 “In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process” and “snapshot” and “of the assembly of the master process model 20 in progress”. Note that Spence’s “solid modelling kernel” is equivalent to Freilich’s CAD system, and exemplified by Solid Edge V6. Additionally, note that Spence’s “physical machining” is equivalent to Freilich’s CAM. Thus, Freilich term

“CAD/CAMming” is implicitly teaching towards the integration of CAD and CAM, as expressly discussed in Spence.

92. In claim 14 and 33, **“said virtual blank is positioned and oriented relative to said coordinate system”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
93. In claim 15 and 34, **“said virtual blank is generated as a three dimensional parametric solid model from a reference set of geometry”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
94. In claim 16 and 35, **“reference set geometry is defined by dimensional characteristics of a modeled part”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
95. In claim 17 and 36, **“establishing said coordinate system comprises one or more datum planes”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.

96. In claim 18 and 37, **“a first datum plane positioned and oriented relative to a reference”** and **“second datum plane positioned and oriented relative to said reference”** and **“third datum plane positioned and oriented relative to said reference”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
97. In claim 19 and 38, **“said first datum plane, said second datum plane, an said third datum plane are orthogonal”** is disclosed by Solid Edge V6 page 29 “Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth.” and page 96 “The types of reference planes are base, global, and local...” and page 28 “base feature”, and page 157 “The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built.” and page 178 “Capturing Design Intent...”.
98. In claims 20 and 39, **“said manufacturing instructions comprise process sheets”** is disclosed by Solid Edge V6 page 90 “feature construction process” and by Spence at Abstract “developing a comprehensive physical machining process simulation program based on a solid modelling kernel”. Note that Spence’s “solid modelling kernel” is equivalent to Freilich’s CAD system, and exemplified by Solid Edge V6.
99. In claims 21 and 40, **“said process sheets are linked with numerically controlled tools and a coordinate measuring machine”** is disclosed by Spence at Abstract “developing a comprehensive physical machining process simulation program based on a solid modelling kernel” and page 553 “Computer Numerical Control” and Freilich column 8 line 49 “scanning device”. Note that Spence’s “solid modelling kernel” is equivalent to Freilich’s CAD system, and exemplified by Solid Edge V6.
100. In claims 22 and 41, **“said master process model is linked with numerically controlled tools and a coordinate measuring machine”** is disclosed by Spence at Abstract “developing a comprehensive physical machining process simulation program based on a

solid modelling kernel” and page 553 “Computer Numerical Control” and Freilich column 8 line 49 “scanning device”.

101. In claims 42 and 44, **“modifying a link among a plurality of modeling elements”** is disclosed by Solid Edge V6 page 178 “Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made.”
102. In claim 47, **“removing said link among said modeling elements”** is disclosed by Solid Edge V6 page 178 “Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made.”
103. In claim 48, **“establishing said link among said modeling elements”** is disclosed by Solid Edge V6 page 178 “Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made.”
104. In claim 49, **“substituting a second plurality of modeling elements for said plurality of modeling elements”** is disclosed by Solid Edge V6 page 178 “Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made.”
105. In claim 50, 55, **“said extracts are linked with numerically controlled tools and a coordinate measuring device”** is disclosed by Spence at Abstract “developing a comprehensive physical machining process simulation program based on a solid modelling kernel” and page 553 “Computer Numerical Control” and Freilich column 8 line 49 “scanning device”.
106. MOTIVATION FOR CLAIMS 2-59. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Solid Edge V6 and Spence to

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modify Freilich. Starting with Freilich's broad discussion of "CAD/CAMming", one of ordinary skill would have looked to Solid Edge V6 for a standard CAD engine (or "solid modeling kernel" in Spence's terminology) and standard techniques for modeling the construction blanks, and the desired dental devices. Further, one of ordinary skill in the art would have looked to Spence to save time and money by automating the complex and labor intensive physical machining process for the complex curves and complex voids in dental devices. Spence abstract uses the terminology "developing a comprehensive physical machining process based on a solid modeling kernel". Additionally, note that Freilich recognizes and implicitly teaches toward the union and merging of CAD and CAM by using the term "CAD/CAMming".

107. Claims 60-118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
108. Claims 60-118 are "manufactured part created by the method" claims, with the same limitations "method" claims 1-59, and thus are rejected for the same reasons as claims 1-59.
109. Note that the prior art discloses the limitations of the "method" claims, and similarly implicitly discloses the "manufactured part created by the method".
110. Additionally, note that claim 1 ("method" according to preamble) and claim 60 ("manufactured part created by the method" according to preamble) appear to have identical limitations, and differ only by the designation of 35 USC 101 statutory categories stated in their respective preambles.
111. Claims 119-152 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
112. Claims 119-152 are "storage medium" claims, with the same limitations "method" claims 1-59, and are rejected for the same reasons.
113. Claims 153-187 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
114. Claims 153-187 are "computer data signal embodied in a computer readable form" claims, with the same limitations "method" claims 1-59, and are rejected for the same reasons.

Response to Amendments or new IDS-FINAL OFFICE ACTION

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115. Applicant's amendments or new IDS necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

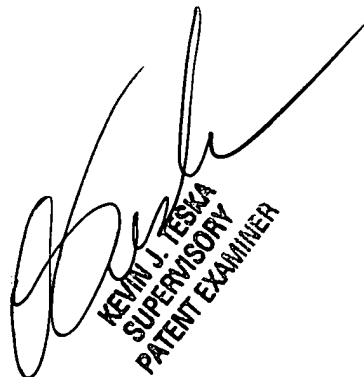
Conclusion

116. All claims stand rejected.

Communication

117. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 571-272-3711. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at 571-272-3761. The fax phone number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

* * * *


KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER